

Appl. No. : 10/644,195
Filed : August 20, 2003

AMENDMENTS TO THE CLAIMS

Please amend the Claim Form and Claim as follows. Insertions are shown underlined while deletions are struck through.

1 (currently amended): A method for forming a silicon-containing insulation film on a substrate by plasma polymerization, comprising the steps of:

introducing a reaction gas comprising (i) a source gas comprising a cyclic silicon-containing hydrocarbon compound containing at least one vinyl group (Si-vinyl compound), and a silicon-containing hydrocarbon compound (Si compound) having no vinyl group, and (ii) an additive gas, into a reaction chamber where a substrate is placed; and

applying radio-frequency power to the gas to cause plasma polymerization, thereby depositing an insulation film on the substrate.

2 (currently amended): The method according to Claim 1, wherein the Si-vinyl compound is a compound or compounds selected from the group consisting of linear silicon-containing hydrocarbon compounds having the formula Si_αO_{α-1}R_{2α-β+2}(OR)_β wherein α is an integer of 1-3, β is 0, 1, or 2, R is C₁₋₆ saturated or unsaturated hydrocarbon, and at least one R attached to Si contains a vinyl group; cyclic compounds having the formula Si_nO_nR_{2n}, wherein n is an integer of 3-6, R is C₁₋₆ saturated or unsaturated hydrocarbon, and at least one R attached to Si contains a vinyl group; and cyclic compounds having the formula Si_p(C₂H₂)_pR_{2p} wherein p is an integer of 3-6, and R is C₁₋₆ saturated or unsaturated hydrocarbon.

3-5 (canceled)

6 (withdrawn): The method according to Claim 2, wherein the Si-vinyl compound is a cyclic compound wherein n is 3.

7 (original): The method according to Claim 1, wherein the source gas further comprises a silicon-containing hydrocarbon compound (Si compound) having no vinyl group.

8 (original): The method according to Claim 7, wherein the Si compound is a compound or compounds selected from the group consisting of linear compounds having the formula Si_αO_{α-1}R_{2α-β+2}(OR)_β wherein α is an integer of 1-3, β is 0, 1, or 2, R is C₁₋₆ saturated hydrocarbon; and cyclic compounds having the formula Si_nO_nR_{2n}, wherein n is an integer of 3-6, R is C₁₋₆ saturated hydrocarbon.

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9 (original): The method according to Claim 7, wherein the flow ratio of the Si-vinyl compound to the Si compound is in the range of 10% to 100%.

10 (original): The method according to Claim 1, wherein the additive gas is selected from the group consisting of a carrier gas, an oxidizing gas, and a plasma stabilizing gas.

11 (withdrawn): The method according to Claim 10, wherein the plasma stabilizing gas is selected from the group consisting of H_2 , C_nH_{2n+2} , C_nH_{2n} , and $C_nH_{2n+1}OH$ wherein n is an integer of 1-5.

12 (withdrawn): The method according to Claim 10, wherein the oxidizing gas is selected from the group consisting of O_2 , CO_2 , H_2O , O_3 , and NO_2 .

13 (original): The method according to Claim 10, wherein the carrier gas is an inert gas selected from the group consisting of He, Ar, and N_2 .

14 (withdrawn): The method according to Claim 1, wherein the radio-frequency power is high-frequency power.

15 (withdrawn): The method according to Claim 14, wherein the high-frequency power has a frequency of 2 MHz or higher.

16 (original): The method according to Claim 7, wherein the ratio is controlled to obtain a siloxan polymer having a film stress of 40 MPa or lower and a dielectric constant of 3.0 or lower.

17 (withdrawn): The method according to Claim 1, wherein the Si-vinyl compound does not contain Si-O bonds, and the insulation film is a hard film composed of a silicon carbide material.

18-24 (canceled)